We claim:

1. A process for producing light olefins, the process comprising the steps of:

(a) contacting syngas in the presence of one or more metal-containing catalysts to produce a first feedstock comprising methanol;

(b) converting a portion of the methanol in a homologation zone to a second feedstock comprising ethanol; and

(c) introducing the first feedstock and the second feedstock to a process for converting the methanol and the ethanol in the presence of a molecular sieve catalyst composition to the light olefins.

2. The process of claim 1, wherein the second feedstock further comprises methanol.

3. The process of claim 1, wherein the process further comprises the step of:

(d) combining the first feedstock and the second feedstock to form a combined feedstock prior to step (c).

4. The process of claim 3, wherein the combined feedstock comprises methanol, ethanol and water.

5. The process of claim 4, wherein the process further comprises the step of:

(e) removing a weight majority of the water from the combined feedstock prior to step (c).

6. The process of claim 4, wherein the combined feedstock further comprises light ends, the process further comprising the step of:

(e) removing the light ends from at least a portion of the combined feedstock, wherein the light ends comprise carbon monoxide, methane and hydrogen.

7. The process of claim 4, wherein the combined feedstock has a methanol to ethanol weight ratio of from about 4.0:1.0 to about 99.0:1.0.

8. The process of claim 7, wherein the methanol to ethanol weight ratio is from about 9.0:1.0 to about 19.0:1.0.

9. The process of claim 1, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

10. The process of claim 1, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

11. The process of claim 1, wherein step (b) comprises contacting the portion of the methanol with a homologation catalyst selected from the group consisting of: potassium oxides, cobalt-molybdenum sulfides, nickel-molybdenum sulfides and potassium carbonates.

12. The process of claim 11, wherein step (b) further comprises contacting the portion of the methanol with the homologation catalyst in the presence of carbon monoxide, optionally hydrogen and optionally carbon dioxide.

13. The process of claim 12, wherein the process for converting the methanol and the ethanol in the presence of a molecular sieve catalyst composition to the light olefins also produces carbon monoxide, wherein the carbon monoxide is separated from the light olefins and is directed to the homologation zone to provide a carbon monoxide source for step (b).

14. The process of claim 1, wherein the one or more metal-containing catalysts comprises one or more of copper oxides, zinc oxides and aluminum oxides.

15. The process of claim 1, wherein the process further comprises the step of:

(d) contacting a natural gas stream with oxygen under conditions effective to convert the natural gas stream into the syngas.

16. An integrated process for producing light olefins, the process comprising the steps of:

(a) contacting syngas with one or more metal-containing catalysts to produce a first feedstock comprising methanol;

(b) contacting a portion of the methanol with carbon monoxide in the presence of a catalyst system to produce a second feedstock comprising ethanol; and

(c) introducing the first feedstock and the second feedstock to a process for converting the methanol and the ethanol in the presence of a molecular sieve catalyst composition to the light olefins.

17. The integrated process of claim 16, wherein the second feedstock further comprises methanol.

18. The integrated process of claim 16, wherein the process further comprises the step of:

(d) combining the first feedstock and the second feedstock to form a combined feedstock prior to step (c).

19. The integrated process of claim 18, wherein the combined feedstock comprises methanol, ethanol and water.

20. The integrated process of claim 19, wherein the process further comprises the step of:

(e) removing a weight majority of the water from the combined feedstock prior to step (c).

21. The integrated process of claim 19, wherein the combined feedstock further comprises light ends, the process further comprising the step of:
(e) removing the light ends from at least a portion of the combined feedstock, wherein the light ends comprise carbon monoxide, methane and hydrogen.

22. The integrated process of claim 19, wherein the combined feedstock has a methanol to ethanol weight ratio of from about 4.0:1.0 to about 99.0:1.0.

23. The integrated process of claim 22, wherein the methanol to ethanol weight ratio is from about 9.0:1.0 to about 19.0:1.0.

24. The integrated process of claim 16, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

25. The integrated process of claim 16, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

26. The integrated process of claim 16, wherein step (b) comprises contacting the portion of the methanol with a homologation catalyst selected from the group consisting of: potassium oxides, cobalt-molybdenum sulfides, nickel-molybdenum sulfides and potassium carbonates.

27. The integrated process of claim 16, wherein the one or more metal-containing catalysts comprises one or more of copper oxides, zinc oxides and aluminum oxides.

28. The integrated process of claim 16, wherein the process further comprises the step of:

(d) contacting a natural gas stream with oxygen under conditions effective to convert the natural gas stream into the syngas.

29. A process for producing light olefins, the process comprising the steps of:

(a) contacting a syngas stream with a methanol synthesis catalyst under first conditions effective to form a methanol-containing stream comprising methanol;

(b) contacting at least a portion of the methanol-containing stream with carbon monoxide and a homologation catalyst under second conditions effective to form a mixed alcohol stream comprising methanol and ethanol; and

(c) contacting at least a portion of the mixed alcohol stream with a molecular sieve catalyst composition under third conditions effective to convert the methanol and the ethanol to the light olefins.

30. The process of claim 29, wherein the mixed alcohol stream further comprises water, the process further comprising the step of:

(d) separating a weight majority of the water from the mixed alcohol stream.

31. The process of claim 29, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

32. The process of claim 29, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

33. The process of claim 29, wherein the mixed alcohol stream has a methanol to ethanol weight ratio of from about 4.0:1.0 to about 99.0:1.0.

34. The process of claim 33, wherein the methanol to ethanol weight ratio is from about 9.0:1.0 to about 19.0:1.0.

35. The process of claim 29, wherein the second conditions comprise a homologation reaction temperature of from about 204°C to about 316°C.

36. The process of claim 29, wherein the homologation catalyst is selected from the group consisting of: potassium oxides, cobalt-molybdenum sulfides, nickel-molybdenum sulfides and potassium carbonates.

37. The process of claim 29, wherein the methanol synthesis catalyst is selected from the group consisting of: copper oxides, zinc oxides and aluminum oxides.

38. The process of claim 29, wherein the mixed alcohol stream further comprises light ends, the process further comprising the step of:
(d) removing the light ends from at least a portion of the mixed alcohol stream, wherein the light ends comprise carbon monoxide, methane and hydrogen.

39. The process of claim 29, wherein the process further comprises the step of:
(d) separating the mixed alcohol stream into a first fraction and a second fraction, wherein the first fraction comprises a weight majority of the methanol present in the mixed alcohol stream, and wherein the second fraction comprises a weight majority of the ethanol present in the mixed alcohol stream.

40. The process of claim 29, wherein the process further comprises the step of:

(d) contacting a natural gas stream with oxygen under conditions effective to convert the natural gas stream into the syngas stream.

41. A process for producing alcohols, the process comprising the steps of:

(a) contacting a first syngas stream comprising carbon monoxide and hydrogen with a methanol synthesis catalyst in a methanol synthesis zone under first conditions effective to form a methanol-containing stream comprising hydrogen, carbon monoxide, methanol and water;

(b) contacting a second syngas stream comprising carbon monoxide and optionally hydrogen with a methanol-containing feed stream and a homologation catalyst in a homologation zone under second conditions effective to form an ethanol-containing stream comprising carbon monoxide, methanol, ethanol, water and optionally hydrogen;

(c) combining at least a portion of the methanol-containing stream with at least a portion of the ethanol-containing stream to form a combined stream;

(d) separating at least a portion of the combined stream in a light ends removal unit into a first fraction and a second fraction, wherein the first fraction comprises a weight majority of the hydrogen and carbon monoxide present in the at least a portion of the combined stream, and wherein the second fraction comprises a weight majority of the methanol, ethanol and water present in the at least a portion of the combined stream;

(e) removing water from at least a portion of the second fraction in a water removal unit to form a third fraction and a fourth fraction, wherein the third fraction comprises a weight majority of the methanol and ethanol present in the at least a portion of the second fraction, and wherein the fourth fraction comprises a weight majority of the water present in the at least a portion of the second fraction; and

(f) separating the third fraction into the methanol-containing feed stream of step (b) and a final product stream, wherein the final product stream comprises methanol and ethanol.

42. The process of claim 41, wherein the methanol-containing feed stream and the final product stream are aliquot portions of the third fraction, and wherein the methanol-containing feed stream comprises methanol and ethanol.

43. The process of claim 41, wherein the process further comprises the step of:
(g) contacting at least a portion of the final product stream with a molecular sieve catalyst composition under third conditions effective to convert the methanol and ethanol to light olefins.

44. The process of claim 43, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

45. The process of claim 43, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

46. The process of claim 41, wherein the final product stream has a methanol to ethanol weight ratio of from about 4.0:1.0 to about 99.0:1.0.

47. The process of claim 46, wherein the methanol to ethanol weight ratio is from about 9.0:1.0 to about 19.0:1.0.

48. The process of claim 41, wherein the second conditions comprise a homologation reaction temperature of from about 204°C to about 316°C.

49. The process of claim 41, wherein the homologation catalyst is selected from the group consisting of: potassium oxides, cobalt-molybdenum sulfides, nickel-molybdenum sulfides and potassium carbonates.

50. The process of claim 41, wherein the methanol synthesis catalyst is selected from the group consisting of: copper oxides, zinc oxides and aluminum oxides.

51. The process of claim 41, wherein the process further comprises the step of:
(g) separating the final mixed alcohol stream into a fifth fraction and a sixth fraction, wherein the fifth fraction comprises a weight majority of the methanol present in the final mixed alcohol stream, and wherein the sixth fraction comprises a weight majority of the ethanol present in the final mixed alcohol stream.

52. The process of claim 51, wherein the process further comprises the step of:
(h) contacting at least a portion of the fifth fraction with a molecular sieve catalyst composition under third conditions effective to convert the methanol contained therein into light olefins.

53. The process of claim 52, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

54. The process of claim 51, wherein the process further comprises the step of:
(h) contacting at least a portion of the sixth fraction with a molecular sieve catalyst composition under third conditions effective to convert the ethanol contained therein to light olefins.

55. The process of claim 54, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

56. The process of claim 54, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

57. The process of claim 54, wherein step (h) occurs in a fixed bed reaction system.

58. A process for producing light olefins, wherein the process comprises the steps of:

(a) contacting a syngas stream comprising carbon monoxide, hydrogen and optionally carbon dioxide with a methanol synthesis catalyst under first conditions effective to form a methanol-containing stream comprising methanol and water;

(b) contacting at least a portion of the methanol-containing stream with carbon monoxide, optionally hydrogen and a homologation catalyst under second conditions effective to form a mixed alcohol stream comprising methanol, ethanol and water;

(c) contacting at least a portion of the mixed alcohol stream with a molecular sieve catalyst composition in a reaction system under third conditions effective to convert the methanol and ethanol to light olefins;

(d) yielding an effluent stream from the reaction system, wherein the effluent stream has an ethylene to propylene weight ratio of about from about 0.9:1.0 to about 2.2:1.0.

59. The process of claim 58, wherein the ethylene to propylene weight ratio is from about 1.1:1.0 to about 1.4:1.0.

60. The process of claim 58, wherein the process further comprises the step of:
(e) removing a weight majority of the water from the mixed alcohol stream.

61. The process of claim 58, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

62. The process of claim 58, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

63. The process of claim 58, wherein the mixed alcohol stream has a methanol to ethanol weight ratio of from about 4.0:1.0 to about 99.0:1.0.

64. The process of claim 63, wherein the methanol to ethanol weight ratio is from about 9.0:1.0 to about 19.0:1.0.

65. The process of claim 58, wherein the second conditions comprise a homologation reaction temperature of from about 204°C to about 316°C.

66. The process of claim 58, wherein the homologation catalyst is selected from the group consisting of: potassium oxides, cobalt-molybdenum sulfides, nickel-molybdenum sulfides and potassium carbonates.

67. The process of claim 58, wherein the methanol synthesis catalyst is selected from the group consisting of: copper oxides, zinc oxides and aluminum oxides.

68. The process of claim 58, wherein the process further comprises the step of:

(e) removing light ends from at least a portion of the mixed alcohol stream, wherein the light ends comprise carbon monoxide and hydrogen.

69. The process of claim 58, wherein the process further comprises the step of:

(e) contacting a natural gas stream with oxygen under conditions effective to convert the natural gas stream into the syngas stream.

70. A process for producing light olefins, the process comprising the steps of:

(a) contacting a first syngas stream comprising carbon monoxide, hydrogen and optionally carbon dioxide with a methanol synthesis catalyst in a methanol synthesis zone under first conditions effective to form a methanol-containing stream comprising hydrogen, carbon monoxide, methanol and water;

(b) contacting a second syngas stream comprising carbon monoxide, and optionally hydrogen with a methanol-containing feed stream and a homologation catalyst in a homologation zone under second conditions effective to form an ethanol-containing stream comprising carbon monoxide, methanol, ethanol, water and optionally hydrogen;

(c) combining at least a portion of the methanol-containing stream with at least a portion of the ethanol-containing stream to form a combined stream;

(d) removing at least a portion of the carbon monoxide, water and hydrogen from at least a portion of the combined stream to form a final mixed alcohol stream;

(e) directing a first portion of the final mixed alcohol stream to the homologation zone to serve as the methanol-containing feed stream of step (b).

(f) contacting a second portion of the final mixed alcohol stream with a molecular sieve catalyst composition in a reaction system under third conditions effective to convert the methanol and ethanol to light olefins;

(g) yielding an effluent stream from the reaction system, wherein the effluent stream has an ethylene to propylene weight ratio of about from about 0.9:1.0 to about 2.2:1.0.

71. The process of claim 70, wherein the ethylene to propylene weight ratio is from about 1.1:1.0 to about 1.4:1.0.

72. The process of claim 70, wherein the first portion of the final mixed alcohol stream and the second portion of the final mixed alcohol stream are aliquot portions of the final mixed alcohol stream, and wherein the methanol-containing feed stream comprises methanol and ethanol.

73. The process of claim 70, wherein the molecular sieve catalyst composition comprises a molecular sieve selected from the group consisting of: SAPO-5, SAPO-8, SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34, SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44, SAPO-47, SAPO-56, AEI/CHA intergrowths, metal containing forms thereof, intergrown forms thereof, and mixtures thereof.

74. The process of claim 70, wherein the molecular sieve catalyst composition comprises an alumina or a silica-alumina catalyst composition.

75. The process of claim 70, wherein the final mixed alcohol stream has a methanol to ethanol weight ratio of from about 4.0:1.0 to about 99.0:1.0.

76. The process of claim 75, wherein the methanol to ethanol weight ratio is from about 9.0:1.0 to about 19.0:1.0.

77. The process of claim 70, wherein the second conditions comprise a homologation reaction temperature of from about 204°C to about 316°C.

78. The process of claim 70, wherein the homologation catalyst is selected from the group consisting of: potassium oxides, cobalt-molybdenum sulfides, nickel-molybdenum sulfides and potassium carbonates.

79. The process of claim 70, wherein the methanol synthesis catalyst is selected from the group consisting of: copper oxides, zinc oxides and aluminum oxides.

80. The process of claim 70, wherein the process further comprises the step of:
(h) separating the final mixed alcohol stream into a first fraction and a second fraction, wherein the first fraction comprises a weight majority of the methanol present in the final mixed alcohol stream, and wherein the second fraction comprises a weight majority of the ethanol present in the final mixed alcohol stream, and wherein the first portion of the final mixed alcohol stream comprises a first portion of the first fraction.

81. The process of claim 80, wherein the reaction system comprises a fast-fluidized reaction zone and a fixed bed reaction zone, wherein a second portion of the first fraction is directed to the fast-fluidized reaction zone for conversion of the methanol contained therein to light olefins, and wherein at least a portion of the second fraction is directed to the fixed bed reaction zone for the conversion of the ethanol contained therein to light olefins.